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Abstract

Background

Cognitive impairment can reduce the self-care abilities of heart failure patients. Theory and preliminary evidence suggest that self-care confidence may mediate the relationship between cognition and self-care, but further study is needed to validate this finding.

Objectives

The aim of this study was to test the mediating role of self-care confidence between specific cognitive domains and heart failure self-care.

Design

Secondary analysis of data from a descriptive study.

Settings

Three out-patient sites in Pennsylvania and Delaware, USA.

Participants

A sample of 280 adults with chronic heart failure, 62 years old on average and mostly male (64.3%).

Methods

Data on heart failure self-care and self-care confidence were collected with the Self-Care of Heart Failure Index 6.2. Data on cognition were collected by trained research assistants using a neuropsychological test battery measuring simple and complex attention, processing speed, working memory, and short-term memory. Sociodemographic data were collected by self-report. Clinical information was abstracted from the medical record. Mediation analysis was performed with structural equation modeling and indirect effects were evaluated with bootstrapping.

Results

Most participants had at least 1 impaired cognitive domain. In mediation models, self-care confidence consistently influenced self-care and totally mediated the relationship between simple attention and self-care and between working memory and self-care (comparative fit index range: .929–.968; root mean squared error of approximation range: .032–.052). Except for short-term memory, which had a direct effect on self-care maintenance, the other cognitive domains were unrelated to self-care.

Conclusions

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Self-care confidence appears to be an important factor influencing heart failure self-care even in patients with impaired cognition. As few studies have successfully improved cognition, interventions addressing confidence should be considered as a way to improve self-care in this population.

Keywords
cognition, heart failure, mediation analysis, self-care, self-efficacy, treatment adherence

Disciplines
Behavioral Medicine | Cardiology | Cardiovascular Diseases | Circulatory and Respiratory Physiology | Medical Humanities | Medicine and Health Sciences | Nursing | Preventive Medicine

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Self-care confidence may be more important than cognition to influence self-care behaviors in adults with heart failure: testing a mediation model

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Abstract

Background. Cognitive impairment can reduce the self-care abilities of heart failure patients. Theory and preliminary evidence suggest that self-care confidence may mediate the relationship between cognition and self-care, but further study is needed to validate this finding.

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Results. Most participants had at least 1 impaired cognitive domain. In mediation models, self-care confidence consistently influenced self-care and totally mediated the relationship between simple attention and self-care and between working memory and self-care (comparative fit index ranges: .929-.968; root mean squared error of approximation ranges: .032-.052). Except for short-term memory, which had a direct effect on self-care maintenance, the other cognitive domains were unrelated to self-care.

Conclusions. Self-care confidence appears to be an important factor influencing heart failure self-care even in patients with impaired cognition. As few studies have successfully improved cognition, interventions addressing confidence should be considered as a way to improve self-care in this population.

Key words: Cognition; Heart failure; Mediation analysis; Self-Care; Self-efficacy; Treatment adherence

Contribution of the paper

What is already known about the topic?

- Cognitive impairment affects 25-50% of adults with heart failure;
- Cognitive impairment may reduce HF patient self-care but literature is inconsistent;
- Only one study reports that self-care confidence mediates between global cognition and heart failure self-care.

What this study adds?

- Self-care confidence totally mediates the relationship between simple attention and heart failure self-care;
- Self-care confidence totally mediates the relationship between working memory and heart failure self-care.
- Interventions addressing self-care confidence might be more effective than interventions based on cognitive training to improve self-care of heart failure patients

Introduction

Heart failure is a pandemic syndrome affecting the 0.5 – 2% of the general population in western countries (Mozaffarian et al., 2015). Almost 6 million people in the US and 15 million people in Europe are affected by heart failure (McMurray et al., 2012; Mozaffarian et al., 2015). Because heart failure prevalence increases with age, it is predicted that by 2030, 25% of the population will have heart failure (Heidenreich et al., 2013).

Heart failure patients experience poor outcomes such as decreased quality of life, repeated hospitalization, and high mortality rates (Falk et al., 2013; Lam and Smeltzer, 2012; Murthy and Lipman, 2011; Song et al., 2010). However, if patients perform adequate self-care they can improve these outcomes (Ditewig et al., 2010; Jones et al., 2012; Tung et al., 2013).

As defined by the situation-specific theory of heart failure self-care (Riegel and Dickson, 2008; Riegel et al., 2015), self-care is a process that involves self-care maintenance, symptom perception, and self-care management. The goal of self-care maintenance is to maintain physiologic stability through treatment adherence (e.g., medication adherence); symptom perception involves monitoring for changes (e.g., checking ankles for swelling); and self-care management, which includes the response to signs and symptoms of a heart failure exacerbation (e.g., recognize symptoms quickly). In the theory, self-care confidence, also referred to as self-efficacy in task-specific self-care behaviors, is said to mediate and/or moderate the self-care process (Riegel and Dickson, 2008; Riegel et al., 2015). That is, factors influencing self-care may do so through self-care confidence (mediation) or different levels of self-care confidence may change the manner in which these factors influence self-care (moderation) (Baron and Kenny, 1986).

An important factor thought to potentially influence self-care is cognition (Dickson et al., 2007). Cognitive impairment is found in 25-50% of adults with heart failure (Dodson et al., 2013; Gure et al., 2012; Pressler, 2008) but literature is inconsistent regarding the influence of cognitive impairment on heart failure self-care. In fact, some studies have shown that cognitive impairment affects self-care (Alosco et al., 2012; Harkness et al., 2013) while others have not (Cameron et al.,

2009). This inconsistency in the literature might be due to the effect of mediators or moderators (such as self-care confidence) that influence the relationship between cognition and self-care. In fact, in a recent study, self-care confidence totally mediated the relationship between cognition and self-care (Vellone et al., 2015), even though cognition was measured only with the Mini Mental State Examination that is useful for screening purposes but it is not advocated to evaluate specific cognitive domains in patients (Cameron et al., 2015). Knowing which specific domain of cognition influences self-care confidence and if self-care confidence mediates the relationship between these specific cognitive domains and self-care behaviors (self-care maintenance and management) would improve our understanding of potential ways to improve self-care. In fact, while it is well known that heart failure self-care can be improved via self-care confidence (Cox et al., 2013; Flynn et al., 2005; Pozehl et al., 2010; Smeulders et al., 2010), we do not have yet strong evidence showing that heart failure self-care can be improved via cognitive improvement (Pressler et al., 2011).

Therefore, the aim of this study was to test the mediating role of self-care confidence in the relationship between specific cognitive domains (simple and complex attention, processing speed, working memory, and short-term memory) and self-care maintenance and management as illustrated in Figure 1. As predicted by the situation-specific theory of heart failure self-care (Riegel and Dickson, 2008; Riegel et al., 2015) and prior work (Vellone et al., 2015), our hypothesis was that these cognitive domains would not have a direct effect on self-care behaviors but would affect self-care behaviors (self-care maintenance and management) *only* indirectly through self-care confidence.

Methods

Design, sample and setting

This was a secondary analysis of data from a descriptive cohort comparison study (Riegel et al., 2011). Methodology of the parent study has been published elsewhere (Riegel et al., 2011). Briefly, the aim of the parent study was to study the influence of excessive daytime sleepiness and cognition on heart failure self-care in a sample of 280 heart failure patients enrolled in 3 outpatient settings in

Philadelphia, Pennsylvania and Newark, Delaware. Patients were enrolled if they had a diagnosis of heart failure, sufficient vision and hearing, with and without mild cognitive impairment (score in the range of 21 – 25 on the Telephone Interview of Cognitive Status tool) (Brandt J, Folstein, 2003) and with (≥6 on the Epworth Sleepiness Scale) (Johns, 1992) and without excessive daytime sleepiness (Johns, personal communication, 2007). Patients were excluded from the study if they lived in long-term care settings, worked at night, had renal failure requiring dialysis, were imminently terminal due to greatly advanced heart failure or another illness such as cancer, had a ventricular assist device, had an history of alcohol or drug abuse in the last year, or had major depression.

Data Collection

The study was approved by the Institutional Review Board of each center where patients were enrolled. Informed consent was formally obtained from each participant before data collection.

Self-care was measured using the Self-Care of Heart Failure Index version 6.2 (Riegel et al., 2009). The Self-Care of Heart Failure Index is a 22-item instrument that is widely used to measure self-care maintenance, management, and confidence; the concept of symptom perception is not measured separately in this version of the Self-Care of Heart Failure Index but the self-care maintenance scale measures both self-monitoring (e.g., checking weight daily) and treatment adherence (e.g., following a low salt diet, taking medications). The self-care management scale measures how quickly patients recognize and evaluate symptoms of a heart failure exacerbation (shortness of breath or ankle swelling), treatment for symptoms (e.g. reducing salt intake, consulting a provider) and treatment evaluation. The self-care confidence scale evaluates confidence in each phase of the self-care process (e.g. confidence in symptom management). Each Self-Care of Heart Failure Index scale (i.e., maintenance, management, confidence) yields a standardized score from 0 to 100 where higher scores mean better self-care. The Self-Care of Heart Failure Index has demonstrated validity and reliability (Barbaranelli et al., 2014).

Cognition was measured using a neuropsychological test battery measuring those domains known to be impaired in many adults with heart failure: simple and complex attention, processing

speed, working memory, and short-term memory. The battery included: Psychomotor Vigilance Task (Dinges D, Kribbs N, Bates B, 1993), which measures simple attention, with a higher number of lapses in attention indicating worse cognition; the Trail Making Test B (Reitan, 1992), which assesses complex attention, with higher score indicating worse cognition; the Digit Symbol Substitution Task (The Psychological Corporation, 2002), which evaluates processing speed, with higher score indicating better cognition; the Probed Recall Memory Task (Lezak M, Howieson D, 2004), which evaluates working memory, with higher score meaning better cognition; and the Letter Number Sequencing test (The Psychological Corporation, 2002), which measures short-term memory, with higher score meaning better cognition. Each test yields a continuous score that can be also dichotomized according to the cut-offs reported in the literature and age-specific norms (The Psychological Corporation, 2002); the dichotomizations were used to compute a summary of the number of tests on which cognition was impaired. Because the cut-points are based on age-specific norms, test results are already adjusted for age. That score summarizing the number of abnormal tests ranged from 0 – 5, with higher scores indicating worse cognition (Riegel et al., 2011).

Sociodemographic characteristics were self-reported. Most clinical information (e.g., illness duration, comorbidity, heart failure type and duration, left ventricular ejection fraction) was gathered from the medical record. Comorbidity was measured using the Charlson Comorbidity Index (Charlson et al., 1987); higher scores indicate higher comorbidity burden. A structured interview was used to gather information on symptom burden, which was used by a cardiologist to score New York Heart Association functional class (Kubo et al., 2004). Most of the data were collected during home visits by research assistants who were registered nurses or psychology master's students. Each of the three enrolling institutions hired separate research staff but all staff were trained in full-day training sessions conducted by the Principal Investigator, the Project Manager, and Co-Investigators. Training involved didactic content, practice sessions, and role playing of testing scenarios. Thereafter, staff met weekly or biweekly with the Project Manager to discuss issues and to assure consistency in data collection.

Data Analysis

This secondary analysis was carried out in four steps. First, descriptive statistics were used to describe sociodemographic and clinical variables, Self-Care of Heart Failure Index scale scores (self-care maintenance, management and confidence), and neuropsychological test scores. Second, in order to detect possible associations that should be taken into account in the third step of the analysis, correlations were computed between Self-Care of Heart Failure Index scales and sociodemographic and clinical variables (i.e., age, gender, education, race, New York Heart Association class, and comorbidity). In particular, correlation coefficients higher than |.29|, the cut-off for weak correlation, were considered as a sufficient reason to adjust the following analysis for these effects. Third, structural equation modeling was used to test the mediating role of self-care confidence between cognition and self-care behaviors (self-care maintenance and management). In order to reduce the number of estimated parameters and to run the most reliable models compared to the number of observations, a single-indicator latent variable was used to compute self-care maintenance, management and confidence scores (Bollen, 1989). Maximum likelihood was used as the estimation method.

In the third step of the analysis, six models were tested, one using the summary cognition score and one for each of the five cognitive domains (i.e., simple attention, complex attention, processing speed, working memory, and short-term memory). In each model, self-care maintenance and self-care management were regressed on self-care confidence, the mediator in our analysis, and self-care confidence was regressed on the summary cognitive score or on one of the five cognition domains investigated. As specified in the situation-specific theory of heart failure self-care (Riegel et al., 2015), self-care management was regressed also on self-care maintenance because mastery of self-care maintenance is thought to precede mastery of self-care management. Moreover, self-care maintenance and management were regressed on the summary cognition score and on each specific cognition domain score to estimate the direct effects of cognition on self-care behaviors along with

the indirect effects via self-care confidence.

In order to account for other variables known to influence cognition and self-care (Cocchieri et al., 2015), the summary cognition score and the specific cognitive domain scores were regressed on all the sociodemographic (i.e., age, gender, education, and ethnicity) and clinical (i.e., New York Heart Association functional class and comorbidity) variables. The only exception to this analysis strategy was in the analysis of the summary cognition score, which was not regressed on age since this score had already been adjusted for age when it was computed. Finally, self-care maintenance, management and confidence scores were regressed on illness duration (expressed in months) because it is known that illness duration affects self-care (Cocchieri et al., 2015). Further paths between sociodemographic or clinical variables and self-care maintenance, management and confidence scores were included in the models according to the correlation analysis conducted in the first step. The fit of the various models was evaluated using the indices reported in Table 3 (Bollen, 1989; Brown, 2006; Kline, 2011).

In the fourth step of our analysis the indirect effects of the summary cognition score and the specific cognitive domain scores on self-care maintenance and management through self-care confidence were estimated, as specified in Figure 1. Indirect effects and their significance were assessed through bootstrapping method (MacKinnon, 2008; MacKinnon et al., 2004) using 5,000 replications of the original sample and considering a 90% confidence interval. Bootstrapping is necessary to estimate significance of indirect effects because the distribution of these product terms is often skewed. Data were analyzed using SPSS version 20 (SPSS, Chicago, IL, USA) and Mplus version 6.11 (Muthén and Muthén, 2015).

Results

Descriptive statistics and correlation analysis

A total of 280 individuals with an age range of 24 to 89 years (Mean=62.0, SD=12.5) were enrolled in the study; complete descriptive statistics are summarized in Table 1. The majority of participants were males (64.3%) with at least a high school degree (90.3%), either White (62.5%) or

Black (34.3%); only 3.2% belonged to other racial or ethnic groups. Therefore, this latter category was coded as missing because its under-representation would have compromised the parameters estimation regarding this variable in the models. The average Charlson Comorbidity Index score was 2.8 (SD=1.7), indicating a moderate level of comorbidity, and the majority of patients were assessed to have significant functional limitation with 58.8% in New York Heart Association class III. The average illness duration was about 6 years but it ranged from a few months to more than 25 years.

Cognitive performance was poor on the Trail Making Test B (Reitan, 1992), with 61.1% of patients demonstrating problems with complex attention. The best performance was seen on the Letter Number Sequencing Test (The Psychological Corporation, 2002), with only 16.1% of patients demonstrating poor short-term memory. The average summary cognition impairment score was 1.7 (SD=1.0) and the vast majority of patients had at least 1 test in which they demonstrated impairment (93.2%).

Correlation analysis showed that none of the sociodemographic and clinical variables were significantly correlated with self-care maintenance, management or confidence scales (Table 2), thus these scale scores were not adjusted for these variables in the mediation analysis.

Mediation analysis

Mediation analysis, performed with a series of structural equation models, showed that self-care confidence totally mediated the relationship between simple attention and self-care behaviors (both self-care maintenance and management) and between working memory and self-care behaviors (Figure 2). Also, as predicted theoretically, self-care maintenance was also a mediator between self-care confidence and self-care management. The summary cognition score, processing speed, complex attention, and short-term memory were neither mediated by self-care confidence nor had a significant relationship with self-care behaviors (data not shown), with the only exception being short-term memory, which had a significant direct effect on self-care maintenance (β=.16, $p<$

.05). All the models tested yielded acceptable fit indices (Table 3), except for a significant but negligible χ^2 value for the processing speed model.

Table 4 shows the indirect effects tested for each model. Simple attention and working memory were the only cognitive domains that indirectly and significantly influenced self-care behaviors (self-care maintenance and management) through self-care confidence. Specifically, working memory influenced self-care confidence first, and then self-care maintenance; simple attention influenced self-care confidence first, then self-care maintenance and lastly self-care management.

The tested models (Figure 2) also showed significant relationships with the other variables. Concerning sociodemographic and clinical variables, three results are worth mentioning. First, age was found to significantly affect all the cognitive domain scores (regression coefficients ranged from -.17 to -.42), indicating that the higher the age the worse the cognitive performance. Second, New York Heart Association functional class had no significant effects, either on the summary cognition score, or on the specific cognitive domains (p>.05). Third, illness duration positively and significantly influenced self-care confidence (regression coefficients ranged from 0.15 to 0.16) and management (from .20 to .21) in all tested models, but not self-care maintenance (p>.05).

Discussion

The aim of this study was to analyse the mediating role of self-care confidence in the relationship between cognition and self-care behaviors. Results illustrate that self-care confidence totally mediated the relationship between simple attention and self-care behaviors and between working memory and self-care behaviors. As the second study of this relationship, these results confirm the important role of self-care confidence in mediating the heart failure self-care process.

In the current study a battery of neuropsychological tests was used to evaluate heart failure patients' abilities in multiple cognitive domains, lending a more precise understanding of the mediating role of self-care confidence than that achieved in the prior study by Vellone et al (2015). In that study, the investigators used the Mini Mental State Examination, a general measure of

cognitive performance with well-known limitations including a ceiling effect in the heart failure population (Cameron et al., 2015); thus heart failure patients may achieve a high score on the Mini Mental State Examination even though they have mild cognitive impairment.

In Vellone et al. (2015) study the investigators found that self-care confidence totally mediated the relationship between global cognition and self-care behaviors. In the present study self-care confidence totally mediated only the relationship between measures of simple attention (Psychomotor Vigilance Task) and working memory (Probed Recall Memory Task) and self-care behaviors. The summary cognition score, complex attention, and processing speed were not significantly related to self-care confidence, maintenance or management in our models, and short-term memory had only a direct effect on self-care maintenance. The analysis of the present study suggests that confidence is only operant in those heart failure patients with problems in the areas of attention and working memory. In these patients, a lack of confidence performing self-care may have led to reduced ratings of self-care. These results are similar to those of Kim et al. (2015) who showed that only memory, and not global cognition, predicted self-care maintenance and self-care confidence.

In the models tested in this study, self-care confidence always influenced self-care behaviors, which reinforces the situation-specific theory of heart failure self-care which specifies this relationship. Except for short-term memory, which had a direct effect on self-care maintenance, no specific cognitive domains directly affected self-care behaviors of maintenance and management. These results suggest that impaired cognition negatively influences self-care behaviors indirectly through self-care confidence. Although this finding was observed only for simple attention and working memory, it highlights the importance of self-care confidence, which seems to have a greater direct impact than cognition on performance of self-care behaviors.

Complex attention and processing speed, elements of executive functions, had no direct effect on self-care behaviors. Also, complex attention and processing speed were not mediated by self-care confidence in our models. Executive function is known to influence decision-making skills

(Gaviria et al., 2011), which could be important in the case of heart failure decompensation when it is essential to act to relieve symptoms (e.g., call the provider). The results of our study support prior theoretical and empirical works illustrating that decision-making regarding self-care is not necessarily logical but is more influenced by a naturalistic decision-making process where prior experiences, values, culture, environment, social support, knowledge and real-world context influence decision-making (Riegel et al., 2015). Also, as proposed in the middle range theory of self-care in chronic illness (Riegel et al., 2012), sufficient self-care may or may not be associated with good decision-making skills. In the study conducted by Dickson et al. (2011), poorer cognitive function was associated with better self-care, which the authors explained as probably due to social support.

These results have important clinical implications. While several authors recommend routine assessment of cognition in heart failure patient (Alosco et al., 2012, Hanon et al., 2014), our results suggest that routinely assessing self-care confidence may be important as well if we want to improve self-care behaviors. In fact, prior studies (Davis et al., 2012; Flynn et al., 2005; Pozehl et al., 2010; Smeulders et al., 2010) have shown that interventions addressing self-care confidence might be more effective than interventions based on cognitive training to improve self-care behaviors of heart failure patients. Also, in a recent systematic review (Clark et al., 2016), self-care confidence and not cognition was identified as one the mechanisms that was important for success in heart failure programs.

This study has several limitations. First, this was a secondary analysis of data from a study aimed at determining if self-care differed in adults with heart failure on the basis of excessive daytime sleepiness and if cognition influenced the relationship. Consequently, no patients with severe cognitive impairment were enrolled in the study. Second, the analysis was conducted on cross-sectional data and consequently we cannot infer causal relationships among the variables. Third, we measured self-care with a self-report instrument that might affect the precision of measurement. However, Self-Care of Heart Failure Index scores have been shown to distinguish

patients educated in self-care from those who are not ($p < 0.001$) (Vellone et al., 2013) and to be significantly correlated with urinary sodium excretion (Song et al., 2010) and lower levels of serum biomarkers of myocardial stress and systemic inflammation (Lee et al., 2011). Fourth, our sample was younger and better educated than the general heart failure population. Fifth, self-care levels were slightly higher than those found in the general heart failure population (Jaarsma et al., 2013). However, our analysis controlled for this variable.

Recommendations for future research include the need to test the mediation model with longitudinal data and to include other cognitive domains such as language and visuospatial ability. These two cognitive domains may not be compromised by heart failure but few studies have been conducted to examine them (Leto and Feola, 2014). Since self-care confidence seems to be a powerful mediator between predictors of self-care and self-care itself, as other studies have shown (Cené et al., 2013; Sayler et al., 2012), future studies should test the mediating role of self-care confidence in the relationship between other factors (e.g., sleep, knowledge on heart failure, depression and anxiety) and self-care in heart failure patients. If future studies confirm that self-care confidence is a powerful influence on self-care behaviors, interventions aimed at improving self-care confidence should be tested.

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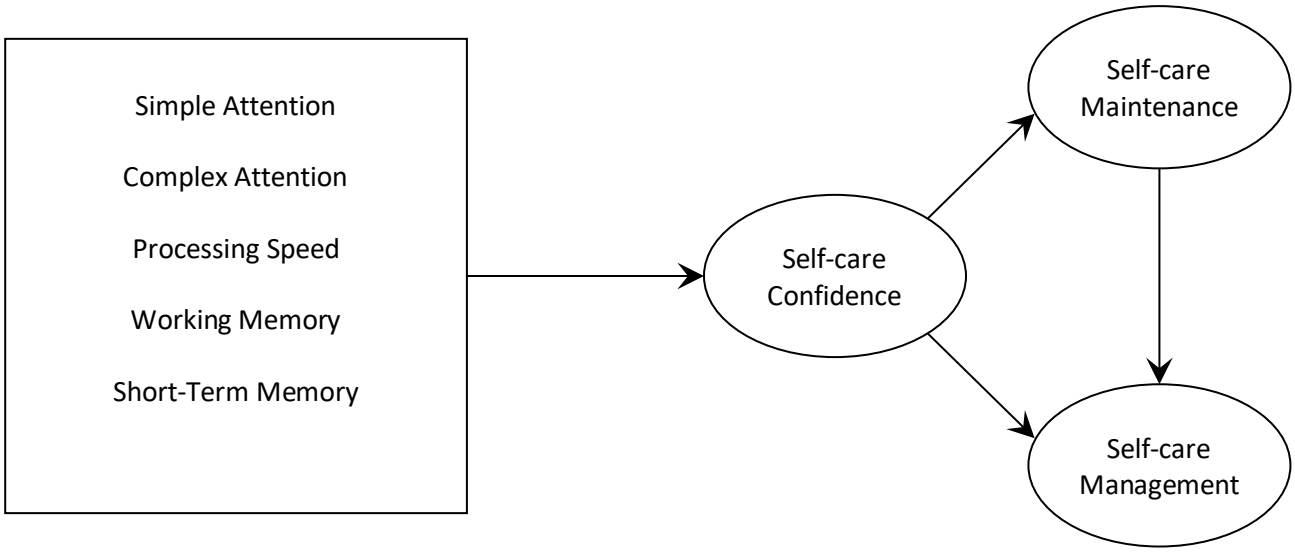

Figure 1. The conceptual model guiding the study.

Table 1. Sample characteristics (n=280): descriptive statistics of sociodemographic and clinical variables, self-care factors, and cognitive scores.

Variable (dummy code)	**Mean (SD)**		**Frequency (%)**	
Age	62.0	(12.5)		
Gender				
Female (1)			100	(35.7)
Male (2)			180	(64.3)
Education				
Less than high school degree (1)			27	(9.6)
High school degree (2)			102	(36.4)
More than high school degree (3)			151	(53.9)
Ethnic group				
Black (1)			96	(34.3)
White (2)			175	(62.5)
Other (missing value)			9	(3.2)
NYHA functional class				
Class I (1)			12	(4.3)
Class II (2)			54	(19.3)
Class III (3)			164	(58.6)
Class IV (4)			50	(17.9)
Charlson Comorbidity Index)	2.8	(1.7)		
Illness duration (in months)	73.4	(65.9)		
Self-care Maintenance	66.8	(11.9)		
Self-care Management	67.4	(18.7)		
Self-care Confidence	75.8	(14.1)		
Summary Cognitive Score	1.7	(1.0)		
Psychomotor Vigilance Task	5.0	(3.5)		
Impaired patients			109	(38.9)
Trail Making Test B	111.2	(59.1)		
Impaired patients			171	(61.1)
Digit Symbol Substitution Test	53.4	(17.5)		
Impaired patients			59	(21.1)
Probed Recall Memory Task	2.0	(1.2)		
Impaired patients			95	(33.9)
Letter Number Sequencing Test	8.7	(3.5)		
Impaired patients			45	(16.1)

Table 2. Correlation analysis

	Self-care maintenance	Self-care management	Self-care confidence
Age	.071	-.095	.035
Gender	-.076	-.070	.001
Education	.097	.089	.022
Ethnicity	.008	-.160	-.011
NYHA functional class	-.073	.014	-.055
Charlson Comorbidity Index	.096	.095	-.007

Note. Pearson's r was used for continuous variables (i.e., age and comorbidity), Spearman's ρ for categorical variables (i.e., gender, education, ethnicity, New York Heart Association class). No coefficient was statistically significant.

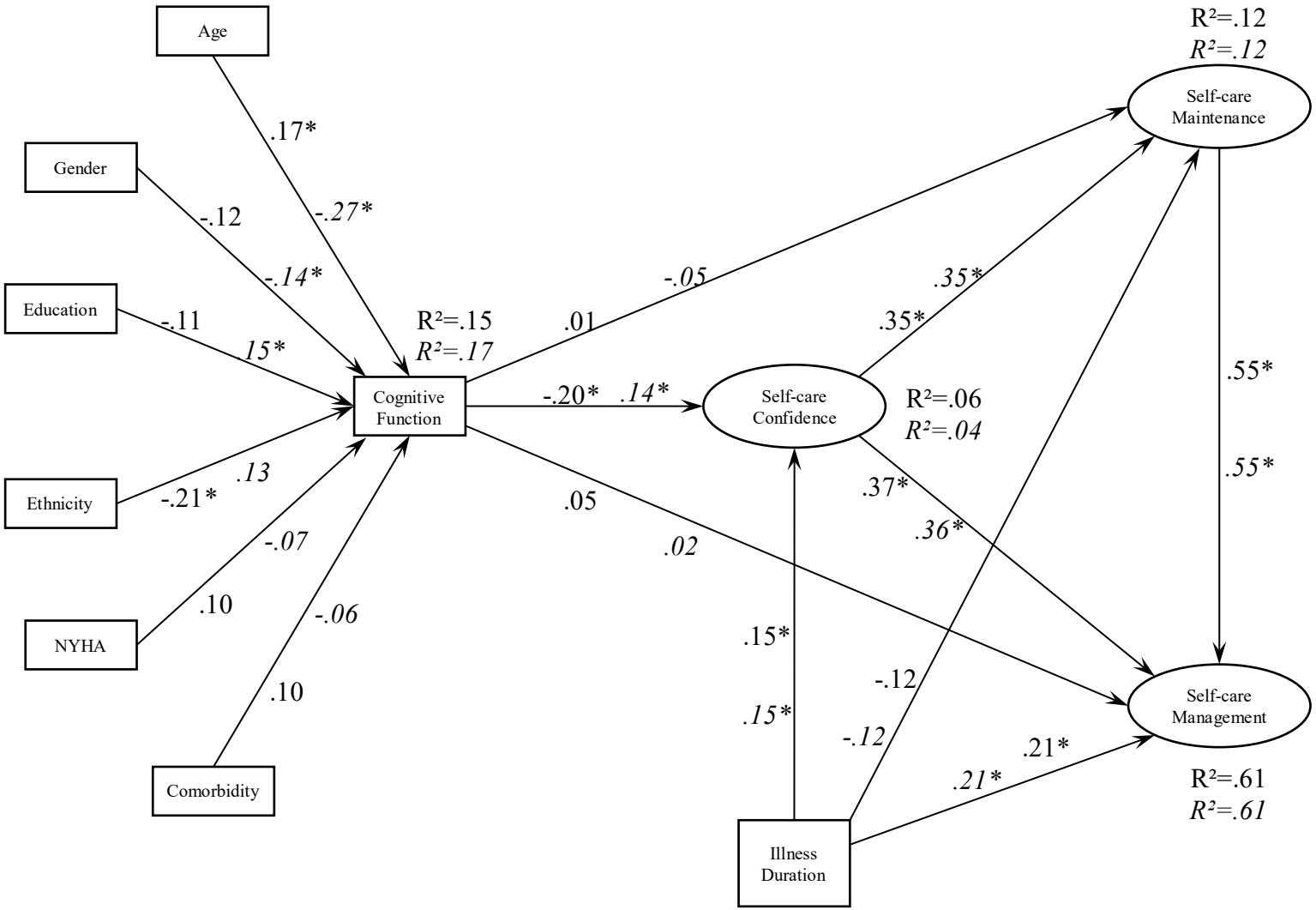

Figure 2. The results of the simple attention and working memory models. Standardized regression coefficients and R-square values for the simple attention model are in Roman text, for the working memory model are in Italics; * p <.05.

Table 3. The fit indices for the structural equation models relative to the summary cognitive score and each cognitive domain.

	χ^2	df	*p* value	CFI	RMSEA	Cfit
Summary cognitive score model	23.53	16	.100	.929	.043	.582
Processing speed model	31.88	19	.032	.942	.052	.425
Simple attention model	25.10	19	.157	.941	.036	.719
Complex attention model	27.02	19	.104	.954	.041	.637
Working memory model	26.11	19	.127	.936	.039	.676
Short-term memory model	23.85	19	.202	.968	.032	.769

Note. CFI = Comparative Fit Index; RMSEA= Root mean squared error of approximation; Cfit=closeness of fit of RMSEA. A good model yields a non-significant χ^2 and Cfit ($p>.05$), a CFI higher than .95 or at least .90 and the RMSEA lower than .05 or at least .08.

Table 4 – Test of the indirect effects estimated for each model: normal theory test and bootstrapped conditional indirect effects.

			Bootstrapping 90% C.I.		
Indirect Effect	Cognitive domain	Estimate	Lower	Upper	Sig.
Self-care Confidence --> Self-care Maintenance --> Self-care Management	Summary cognitive score	.184	.091	.277	*
	Processing speed	.186	.095	.276	*
	Simple attention	.188	.093	.284	*
	Complex attention	.186	.095	.277	*
	Working memory	.191	.097	.286	*
	Short-term memory	.192	.097	.287	*
Specific Cognitive Function --> Self-care Confidence --> Self-care Management	Summary cognitive score	-.018	-.068	.033	ns
	Processing speed	.028	-.021	.078	ns
	Simple attention	-.073	-.138	-.008	*
	Complex attention	-.020	-.071	.030	ns
	Working memory	.050	-.003	.104	ns
	Short-term memory	.001	-.047	.047	ns
Specific Cognitive Function --> Self-care Confidence --> Self-care Maintenance	Summary cognitive score	-.060	-.228	.109	ns
	Processing speed	.028	-.016	.073	ns
	Simple attention	-.067	-.121	-.014	*
	Complex attention	-.019	-.064	.026	ns
	Working memory	.049	.002	.096	*
	Short-term memory	.001	-.024	.025	ns
Specific Cognitive Function --> Self-care Confidence --> Self-care Maintenance --> Self-care Management	Summary cognitive score	-.009	-.034	.016	ns
	Processing speed	.015	-.009	.040	ns
	Simple attention	-.037	-.070	-.004	*
	Complex attention	-.010	-.035	.015	ns
	Working memory	.027	-.001	.054	ns
	Short-term memory	.001	-.043	.043	ns

Note. * = significant; ns = non-significant.

The table contains specific indirect effect (reported in the 1st column), cognitive domain that identifies the model (2nd column), standardized estimate of the effect (3rd column), 90% confidence intervals based on 5,000 bootstrapping samples (4th and 5th column), and significance (6th column).